

## THE CLAIMS

I claim:

1. A laser, comprising:

a first optically reflective element;

a second optically reflective element opposed to and aligned with said first optically reflective element to define a laser cavity having an optical axis;

a laser dye gain element having a laser dye and which is interposed between said first and second optically reflective elements along said optical axis for transforming an optical pump signal into a resonant optical signal;

a laser diode system for generating and injecting said optical pump signal into said laser cavity along said optical axis, where said optical pump signal is a sequence of optical pulses having a duration of about  $n\tau_f$ , where  $\tau_f$  represents a fluorescence lifetime of said laser dye, and  $3 \leq n \leq 25$ .

2. The laser of claim 1 wherein said optical pump signal has a pulse period in the range of about 1 KHz to 1 Mhz.

1        3. The laser of claim 1 wherein said laser dye gain element includes a host material selected  
2        from the group that includes porous glass, plastic, and sol-gels.

1        4. The laser of claim 3 wherein said plastic consists essentially of modified polymethyl  
2        methacrylate.

1        5. The laser of claim 1 wherein said first optically reflective element has a curved reflective  
2        surface.

1        6. The laser of claim 5 wherein said first and second optically reflective elements define a  
2        nearly hemispherical resonator.

1        7. A method for generating a laser output signal, comprising the steps of:

2        generating an optical pump signal that is a sequence optical pulses each having a duration of  
3        about  $n\tau_f$ , where  $\tau_f$  represents a fluorescence lifetime of a laser dye and  $3 \leq n \leq 25$  ;

4        directing said optical pump signal into an optical resonant cavity having a laser dye gain  
5        element that contains said laser dye for transforming said optical pump signal into an excited  
6        optical signal;

7        resonating said excited optical signal in said optical resonant cavity; and

8 emitting a portion of said excited optical signal from said optical resonant cavity.

1 8. The method of claim 7 wherein said optical pump signal has a pulse period in the range of  
2 about 1 Khz to 1 Mhz.

1 9. The method of claim 7 wherein said laser dye gain element includes a host material  
2 selected from the group that includes porous glass, plastic, and sol-gels.

1 11. The method of claim 9 wherein said plastic consists essentially of modified polymethyl  
2 methacrylate.

1 12. The method of claim 7 wherein said optical resonant cavity is a nearly hemispherical  
2 resonator.